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**SPECIAL REPORT: OVERCOMING DRUG ADDICTION**

Human beings have taken drugs for thousands of years, but perhaps never before has this behavior become such an explosive social issue as it is today. All the major news media now report drug-related horror stories almost daily, ranging from broken homes to train accidents to a new breed of urban gangs that kill and terrorize people randomly. Despite a long American tradition of civil liberties, the federal government and many large corporations have begun drug-testing of their employees. To stem the flow of illegal substances into the country, the U.S. has instituted a "zero tolerance" procedure that empowers it to impound any vehicle entering the country, on land or water, in which is found the slightest amount of illegal substance. In Congress, there are calls for the death penalty for drug dealers, and the use of our armed forces to seal our borders against foreign drug traffic.

In an earlier issue of SCIENTIA (Vol. 1., No. 1), I argued that most of what our society has done or proposes to do to eliminate the use of drugs is doomed to failure. The urge to take psychoactive substances is a very old and powerful one, and not only is it impossible to legislate it out of existence, but, I believe, it's not entirely desirable to do so, either. While any drug is potentially dangerous, and should be treated with great respect, the fact remains that many of them, if taken properly, may have

considerable physical, emotional and spiritual benefits. At the very least, they relieve stress, which probably contributes to far more deaths in this country than any drug does. And some drugs may provide individuals with access to higher consciousness, introducing them to a spiritual dimension that has become almost totally unknown and forgotten in our materialistic society.

Nevertheless, the fact remains that drug addiction—to legal as well as illegal substances—is a serious problem. Many individuals seem unable to take any drug without becoming addicted to it, and there are some substances, such as heroin and other opioids, that are addictive for almost everyone. Most of the solutions to the drug crisis that have recently been proposed—from the mandatory death sentences for dealers demanded by hardliners, to the expanded education programs favored by moderates, to the radical call for legalization—won't provide the slightest bit of solace to those who are now addicted to drugs. These people need immediate help. The question is, how? Can addicts in fact quit their habit?

Recently, I have had the opportunity to examine this issue firsthand. Several months ago, someone I know, who had been a substance abuser for many years, entered a drug detoxification program. This person (whom I shall call simply "he" or "X") is

now clean, and while he cannot really be regarded as completely cured (a point I shall elaborate on later), the changes in his life that he has been able to accomplish so far, I think, hold out tremendous promise for millions of other addicts. Though X's drug problem was somewhat different from that commonly portrayed in the media, in that he took the substance for what were basically medical, as opposed to recreational, purposes, his dependence was extremely deep-rooted, probably going back to childhood.

The program X entered has been used, with little fanfare but considerable success, to treat hundreds of addicts, long-time users of substances that include alcohol, heroin, cocaine, and amphetamine, as well as some less common drugs. What follows is a description of the recovery process that is based largely on his experiences, but also, to some extent, on those of other ex-addicts that I met through him.

Any complete and successful withdrawal from drug addiction almost always takes place in two stages. First, there is physical withdrawal from the drug, which ends when all craving for the substance has ended. How long this stage takes depends on many factors, but particularly on the drug involved, and how abrupt the withdrawal. If the individual withdraws by abruptly ceasing to take any drug—as in the "cold turkey" associated with heroin users—the with-



drawal is relatively quick, but also intensely painful. The intensity of withdrawal pain can be lessened considerably by reducing the amount of drug taken gradually, but then the withdrawal takes much longer.

In the program that X entered, all withdrawal is done abruptly. X was given certain (relatively) non-addictive medications to make the process a little more bearable, but it was still extremely traumatic—more so, I believe, than any of us who have not undergone the experience can possibly understand. Withdrawal is definitely *not* to be compared to a “mild case of the flu”, as one of Nancy Reagan’s aides recently asserted. X in fact constantly threatened to commit suicide throughout most of this stage—every day for more than a week—and I think almost certainly would have made good on the threat had he the means. It is simply impossible to overestimate the agony of drug withdrawal; the pain is such that only those who are put in a situation where all other choices have been removed from their control can endure it.

Because abrupt withdrawal is so agonizing, some professionals feel that the process is better done gradually, progressively reducing the amount of substance taken over time. This was my own feeling at the time X entered the program. However, because gradual withdrawal takes so much more time, there is more opportunity for the addict to have second thoughts, and to quit the program before completely withdrawing. Furthermore, because the addict has continued, if limited access to the drug in a gradual withdrawal program, one could argue that he or she has not really confronted the addiction with total honesty. Most addicts, when first facing the notion of withdrawal, will invent endless excuses and rationalizations to prolong their habit; these excuses have to be mercilessly destroyed if the withdrawal is to be successful, and any program that allows some access to the abused substance tends to support, rather than eliminate, these excuses. Thus while different individuals may fare better in different types of programs, I now suspect that abrupt withdrawal, for all its misery, probably has a higher chance of success.

When physical withdrawal is complete, the individual no longer feels any craving for the drug. The memory of the drug experience or high may still be very strong and alluring, but there is no longer any compulsion to take the substance. The difference, to make a rough analogy, is like that between someone who is starving, and must have food to survive, and someone who (at a particular moment in time) is well-fed. To the latter individual, food may be very tempting, but it is not irresistible.

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However, still ahead is a very lengthy process of what might be called psychological withdrawal, in which the problems that originally led to the addiction must be confronted and dealt with. If these problems are not acknowledged—if the ex-addict simply leaves the program and returns to his or her original life—the odds that relapse will occur are enormous. While we know very little about the root sources of drug addiction—as with so many other illnesses, they presumably may be genetic and/or social-environmental—there is little question that whatever lifestyle the recovering addict led prior to beginning treatment helped nourish the habit, and will do so again.

This withdrawal process takes much longer. Indeed, for most addicts it may be a lifetime process, for in the view of many authorities, drug addiction is never really cured so much as avoided. However, for the addict who remains clean, definite improvements do occur. Thus my acquaintance X, upon completing physical withdrawal and leaving the hospital, reported initially suffering through long periods of devastating fear and anxiety that occurred daily; these fears were not tangible or concrete, but had to do with a general meaninglessness of life. While these fears have not completely subsided, today, several months after completing the physical withdrawal, he claims to feel considerably better. Other ex-addicts that he has talked to describe similar experiences.

To understand why addiction should be so hard and take so long to over-

come, it's useful to consider an analogy often used by the nurses in the program X went through. Withdrawing from a drug, they pointed out, is something like having an operation, in which some organ is removed from the body. Immediately following surgery, there is intense pain (blunted by drugs), which subsides relatively rapidly. But then the patient must go through a long recovery period, in which the body gradually learns to adjust to the absence of the organ.

After many years of taking a drug, the latter becomes very much like an organ in the body; it becomes an intimate part of one's physiology, creating a special place for itself. So it's not surprising that when the drug is removed permanently, the body reacts just as it would after surgery. In this case, the initial shock is manifested in physical withdrawal; the agony of this process, in a very real sense, is like having major surgery, but with no anesthetic. And the recovery period corresponds to psychological withdrawal, in which the body must adjust to what is now missing.

All drug withdrawal programs now recognize that a major key to success throughout the process, but especially in the second stage, is emotional support. This needs to come from family and friends, and often, from a professional therapist as well. But probably the most critical support comes not from either of these sources, but from other recovering addicts, who alone can sympathize with and understand what one another are experiencing. This has definitely been the case for X, and for hundreds of other addicts that he meets with regularly.

The support group that X and these other addicts belong to is called Narcotics Anonymous (NA), and is modelled closely after Alcoholics Anonymous. Like AA, NA is based on what is called the Twelve Step Program. Briefly, these steps include admitting that one has a problem that one has no control over; seeking help through appeal to a spiritual force in one's life; taking detailed stock of all one's faults and weaknesses; making amends to people one has wronged; and encouraging other addicts also to follow this program.

NA (and AA) have two major features that distinguish them from most other forms of group or individual therapy, and which are undoubtedly critical to their success. First, there is virtually no leadership or



authority in these groups. They are organized and run entirely by the recovering addicts themselves, and the meetings themselves generally consist of a simple sharing of feelings and experiences. Everyone is encouraged (but not forced) to describe his or her problems. There are virtually no rules except: one person talks at a time; no one interrupts or criticizes anyone else; what is said stays within the group.

The advantage of such a democratic approach is that it encourages those first confronting their problem to share it. Even the shyest, most embarrassed or confused people—as recovering addicts of course tend to be—find it relatively easy to open up in this atmosphere, because it is so completely non-threatening. No matter how sick and how difficult one's life has been, one can always find someone whose life has been just as bad. Thus while all come to confront the fact that they are sick, no one feels out of place, or inferior, or—most important of all—beyond help.

This notion of therapy carried out without the guidance of a professional therapist or other authority is quite unique, and may possibly have broader relevance, extending to psychological problems other than drug addiction. Recently, a former therapist, Jeffrey Masson, has attacked some of the basic concepts of conventional psychotherapy, in such books as *Assault on the Truth* (a rather severe critique of some of Freud's practices) and the just-published *Against Therapy*. In the latter book, Masson argues that all therapists inevitably have an inordinate degree of control over their clients, and goes so far as comparing the therapist's position to that of a jailer. In support of this charge, he notes the well-documented cases in which therapists have taken advantage of their patients, particularly sexual abuse.

Nevertheless, while the leaderless approach of NA and AA seems to work very well for the initial stages of the recovery, one may question whether it is appropriate or effective for later stages. Valuable as the experiences of other addicts may be, one would think that, at a certain point, the recovering addict, or anyone else with a serious psychological problem, needs to have some advice and direction from people who are relatively healthy, in the sense that they have no addiction problem. While one can argue that such people don't really understand the addict's problems, one can

also argue that, at some point in the path to recovery, this no longer matters. What matters is that the addict learn a lifestyle that does not contribute to addictive behavior, and non-addicts are obviously the best role models.

**In a highly controversial book, *Against Therapy*, former analyst Jeffrey Masson argues that all therapists have an inordinate and dangerous degree of control over their patients.**

In addition, the problem of control that Masson raises is perhaps much deeper than he realizes. While a therapist may indeed exert considerable control over a patient's life, so may any group, no matter how democratic. The control that NA or AA exerts on many of its members is revealed by the fact that many recovering addicts go to these meetings for years, becoming quite dependent on them to provide any meaning in their lives. Many recovering addicts, it seems, would be lost without the group; in a very real sense, it becomes a new addiction, one that replaces the drug. To say this is not to criticize NA or AA, which are certainly a far healthier alternative for the ex-addict than returning to the drug. It is simply to point out that all of us must in fact submit to certain forms of control in order to make our lives meaningful. The real issue is not avoiding control, but learning to submit to those forms that in some way enhance our lives—forms of control that perhaps carry the seeds of their own transcendence.

The second unusual feature of NA/AA is that it recognizes God, or some higher spiritual force, as critical to the recovery process. These groups are completely non-denominational, and God is rarely mentioned or referred to explicitly except in statements or prayers that open and close every meeting; but the recovering addict is encouraged to develop a religious or spiritual sensitivity to help overcome his or her problems. Again, there is no compulsion associated with this idea; but the atmosphere of the meetings, where people are revealing the most personal and sensitive areas of their lives, tends to foster the letting go or submissive process that is so important to spirituality.

This, too, is a notion that has much broader implications for psychotherapy. A small but important minority of psychologists and psychiatrists has long lamented the

absence of spirituality in the practice of mainstream psychiatry. Indeed, the greatly diminished role of religion or spirituality in our society is arguably a major source of most psychological problems to begin with. The fundamental problem underlying most psychopathologies is a loss of meaning in life, and our society, where unbridled pursuit of materialism is the chief value, seems to have no deeper meaning. Spirituality provides such a meaning; however it is understood, it gives people something to live for.

Bringing God into the therapeutic process is not entirely without problems. Earlier this year, a man who was sentenced to attend AA meetings as part of a probationary program following a drunk driving charge contended that these meetings violated his religious beliefs—or rather, lack of them, since he considered himself an atheist. However, in light of the completely unforced atmosphere of such meetings, it is hard to see how even an atheist can justifiably complain that his beliefs are violated. It is, after all, not necessary to agree with a group of people on every major issue in order to benefit from their association.

My acquaintance has come a long way from the abyss of drug addiction, and I now realize that many others have as well. Still, for every addict who has come so far, there are dozens, if not hundreds, who have not yet taken this first step. Can this kind of program work for them, too?

There seem to be two major obstacles at present. First, as has long been pointed out by those working to help addicts, the available recovery programs in this country are woefully inadequate. In many large cities, there are long waiting lists to get into the treatment centers. The wait may take months, and for most addicts, who have extreme doubts about their desire or their ability to quit their habit, anyway, it provides an excellent rationalization for not trying.

Furthermore, many of the treatment programs that are available are inadequate to serve the needs of most addicts. My acquaintance X, for example, before going clean tried several other programs in San Francisco, all without success. Most of these programs are run on an out-patient basis, which enables them to treat many more individuals than is possible in a hospital setting, but which also cripples their capacity to deal successfully with all but the



mildest cases of addiction. Because drug withdrawal generally is so intense and painful, it is virtually essential to go through with it in a hospital or other structured environment where medical help is available immediately and at all hours.

A serious commitment by this country to do something about treating as well as preventing drug addiction could alleviate this problem considerably. Ironically, although the program that X completed was very expensive, and beyond the means of many people without medical insurance, drug withdrawal need not be inherently expensive. That is to say, the medical procedures needed for treating withdrawal are really quite simple and uncomplicated, compared to surgery and other high-tech practices of modern hospitals. X was under the direct eye of a doctor for only a few minutes a day, and his role was largely limited to administering medications—something any paraprofessional could do. The main requirement is simply a place where the addict can be watched and attended to by emotionally supportive people.

Even with an adequate number of treatment centers, however, a second and probably bigger obstacle must be overcome. The individual addicts themselves must be persuaded to submit to treatment. The problem here is that while there is an important role to be played by family and friends, no one can really force an addict to go clean. Ultimately, addicts must decide that they really want to do this, and in most cases, unfortunately, this decision is made only when they have hit bottom, running out of money, friends, family support, and everything else needed for survival at a minimal level.

Thus while there are many addicts who desperately want help, probably the vast majority do not see themselves in these terms. Many addicts in fact can live quite comfortably with their habit, raising a family, holding a job, and doing other things that ordinary people do. Their success at these things makes it easy to rationalize their dependence, or to pretend that it doesn't exist, particularly when the dependence is to a legal, socially approved substance such as alcohol. One can hardly fail to observe that all the negative publicity that drugs have received in recent years has not made a noticeable dent in this problem.

This, I believe, is where the spiritual approach taken by groups like AA and

NA is essential. As I noted in the beginning of this article, many psychoactive substances can provide spiritual experiences. Many people take these substances at least in part to experience such states, particularly initially. Even those whose drug abuse seems totally pathological are, as noted earlier, almost certainly responding to a loss of meaning in their lives, which is directly related to the lack of genuine spiritual outlets.

Unless an addict has hit bottom, and has nowhere else to go, it is unrealistic to expect him or her to give up the habit without any promise of something to replace it. Life as he or she understands it led to the problem, and will do so again and again and again. Part of any drug education program—preventative as well as therapeutic, but especially the latter—thus should be to change this understanding, to re-introduce this spiritual dimension into our lives.

## SCIENCE VS. THE PRESS: TWO KINDS OF TRUTH

Every once in a while, a scientific discovery is announced that has truly revolutionary implications; a finding that is not simply unexpected but seemingly impossible, because it is incompatible with science's most fundamental, long-unquestioned assumptions about the world. Such an event occurred recently, and predictably, has caused considerable sensation, both among the public, and for rather different reasons, among scientists. Beyond the validity of the research findings, however, which are actually discounted by almost all scientists themselves, lies what may be a much bigger story. The way in which this research was reported, I think, provides evidence of a large and increasingly noticeable conflict between science and the general press, a conflict that fundamentally involves two different concepts of truth.

The furor began about two months ago, when a research group in France reported that certain antibodies—the large protein molecules that are one of our body's major defenses against disease—were active at extremely dilute concentrations. The group, headed by Dr. Jacques Benveniste, was using a system in which antibodies to a certain type of cell induce the cell to secrete a substance into its sur-

rounding medium (see Figure on p. 6). By measuring the amount of substance secreted, the researchers could gauge the effect of the antibodies. This kind of experimental assay is quite common, and normally when scientists carry it out, they find that the antibodies have an effect that becomes progressively less at diluter concentrations. Eventually, a concentration is attained at which no effect at all is observed.

Benveniste and his colleagues, however, claimed that a very strong and reproducible effect could be observed even at extraordinarily dilute concentrations of antibody— $10^{-23}$  moles per liter or less. One mole of a substance represents approximately  $10^{23}$  molecules, so concentrations

of any substance that are less than  $10^{-23}$  moles per liter contain, in theory, less than one molecule. In other words, when a dilution is carried out to this degree and still lower, there should be no molecules of the substance present at all.

The story produced an immediate sensation in the popular press, for it seemed to provide experimental support for one of the major claims of homeopathic medicine. Homeopaths claim to be able to treat a variety of illnesses by administering to the patient a substance connected with that illness. However, in order not to evoke the symptoms of the disease itself, they administer this substance at very dilute concentrations—concentrations that are, sometimes, below that theoretically containing a single molecule of the supposed active substance.

For just this reason, most scientists have long been skeptical of homeopathy. The results of Benveniste's group, however, seemed to demonstrate that such effects are, after all, possible. The researchers even proposed a highly speculative theory to account for their results. The antibody molecules, they suggested, somehow altered the structure of the water molecules immediately surrounding them. In effect, the water molecules acted like a mold, becoming "imprinted" with the highly specific shape of the antibody. This mold of water molecules, according to Benveniste's theory, retained its shape in the absence of any antibody molecules, and exerted effects on its own.

Benveniste's report has produced a sensation in the scientific community as



## IN BRIEF

**Variation in AIDS virus.** In devising a vaccine against the AIDS virus (HIV), a major worry has been that the virus may mutate rapidly, resulting in new strains that may not be sensitive to the vaccine. A series of recent studies carried out by investigators from several laboratories now confirm that the virus indeed can mutate very rapidly in the body.

The researchers, located at the University of Alabama, the University of Miami Medical Center, and the National Institutes of Health, isolated HIV from the blood of several AIDS patients, and cloned individual HIV DNA molecules from the virus. In this technique, the DNA from HIV is extracted, inserted into another kind of virus that infects bacteria, and this latter virus used to transfer the HIV genome into bacterial colonies. Individual bacterial colonies can then be grown that contain the DNA for a single type of HIV.

The investigators found that in every case, the HIV isolate contained multiple forms of closely-related, yet genetically distinct, HIV genomes. In one patient, 17 different varieties of HIV were detected, with the extent of variation between individual varieties ranging from about 5-30%.

The significance of this variation is still not fully understood. It is actually less than the variation between HIV molecules isolated from different individuals, which can be 50% or greater. However, in a related study, these investigators demonstrated that some of the isolated varieties of HIV were less infectious than others.

**Multiple forms of memory.** Recent studies of patients with fairly small and discrete lesions in the brain have revealed that memory is highly selective. For example, a patient has been described who had a selective loss of memory for fruits and vegetables; when asked to describe anything in this category, he was unable to do so, although his memory for other kinds of categories was intact.

New work now indicates that memories may be even more discrete than this. Rosaleen McCarthy and E.K. Warrington at the National Hospital for Nervous Diseases in London examined a patient with a lesion in his left temporal lobe, a region of the brain long implicated in memory storage. When tested, this man was able to

identify and describe any number of common, inanimate objects, but had great difficulty with animals. When given the name of some living thing, he was frequently unable to describe it at all, although the word was familiar to him. Further tests revealed that the man's inability to describe living things occurred only when the questions were posed to him verbally, as when the experimenter named an animal, and asked him to describe it. In contrast, when a picture of the same animal was presented, the man almost invariably was able to provide a complete description of it.

These findings seem to indicate the existence of two different areas of memory storage in the brain, one for verbal memory, and one for pictorial. Why the brain should be organized in this seemingly overly redundant manner is a mystery to researchers.

**Social support and health.** While this century has seen the triumph of the germ theory of disease, scientists now recognize that many environmental factors may also affect a person's health. These include diet, air and water pollutants, stress, exercise and the quality of social relationships. Of all these factors, the last is the one whose effect on health we know the least about. It is very difficult to conduct studies relating the two in which other factors can be ruled out; it's also difficult to explain how social relationships could affect physical health, in terms of current scientific paradigms.

In the past decade, however, scientists have begun to accumulate an important body of data bearing on this issue, using long-term, prospective studies. Unlike previous work, which simply examined in retrospect the lives of people who died from various causes, prospective studies follow selected groups of living people over a long period of time. Reviewing these studies, James House and his colleagues at the University of Michigan recently concluded that there is now overwhelming evidence that social relationships are associated with increased health, in particular, with a longer life, even after other possible risk factors are taken into account. Important social ties revealed in these studies include marriage, extended families and friends, church membership, and various voluntary organizations.

Other relevant studies cited by

House, et. al. include those with animals, in which contacts with other members of their species reduced the effects of experimentally-induced stress. Such effects have been observed in humans as well as in a variety of other mammals, and can involve contacts between members of different species. For example, petting and other forms of human attention can reduce certain signs of stress in animals, and some work suggests that the relationship is also beneficial for the person.

House, et. al. suggest that in light of this evidence, we may want to promote social relationships, in much the same way as we have begun to promote exercise, certain forms of nutrition, and the avoidance of carcinogenic substances. While it's hard to argue against the value of social relationships, any role of the government in promoting them is sure to raise controversy.

**God is dead (again).** Science is not incompatible with the existence of God, and many scientists quite unabashedly believe in a higher spiritual power. Still, to some scientists, the idea of God is quite unnecessary, and a few would like to get rid of the notion once and for all.

The latest to sound off is William Provine, an evolutionary biologist at Cornell University. Writing in a recent issue of *MBL Science*, he argues that a correct understanding of modern Darwinism leaves no room for the belief in God, nor even further, for the belief that any kind of purposive, non-mechanistic process exists in the Universe.

Like other sociobiologists, Provine does not believe that his extreme views are incompatible with ethics. He argues that ethical values have evolved over time through the interplay of genetic changes with the environment.

Some of Provine's case is valuable, as when he points out the weaknesses in arguments that support the existence of free will. But the attempt to explain moral values through purely evolutionary means has serious problems (see *SCIENTIA*, Vol. 2, No. 1). Moreover, as Provine himself admits, his view that science and religion are incompatible provides fuel for Creationists, who would do away with science completely.

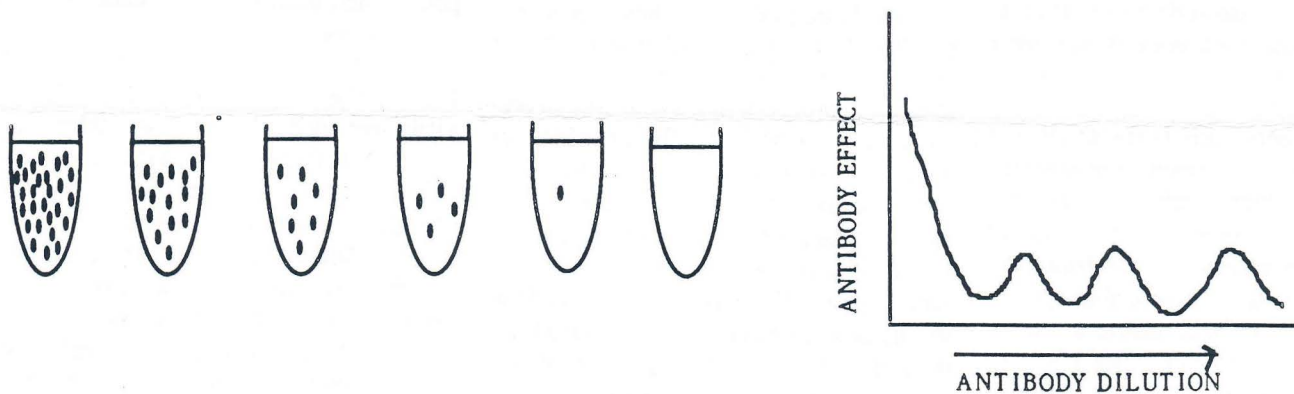
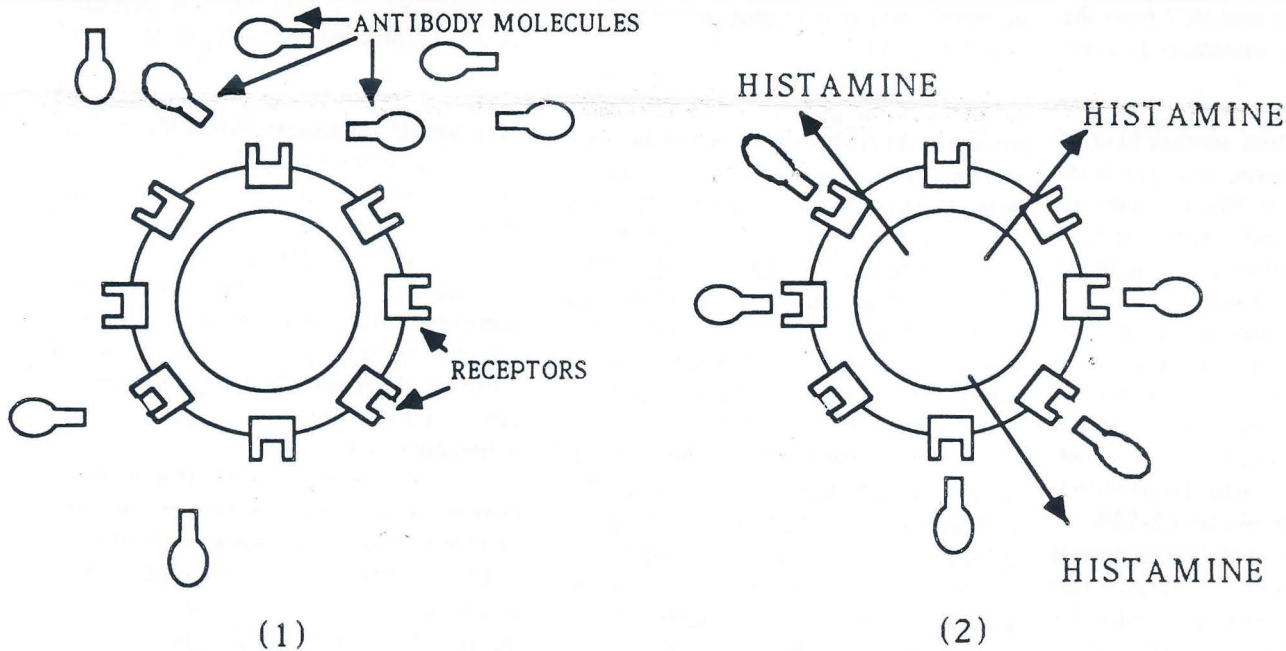


well, but for somewhat different reasons. Most scientists are highly skeptical of his findings, not only because they contradict long-established scientific views—the theory of antibody imprinting of water molecules flies in the face of everything known about chemistry—but because many somewhat similar studies have failed to reproduce his results. Furthermore, since Benveniste's report, several laboratories have attempted to repeat his studies almost exactly, and all have failed to observe the low dilution effect.

At this point, therefore, very few, if any, scientists believe Beneviste's results, although at least a few do believe the issue is still unresolved. What has caused an uproar among scientists, however, is the manner in which this research was reported by the scientific journal, *Nature*, in which it appeared. The events preceding and immediately following publication of this study, which have largely been ignored by the general media, provide a compelling picture of the conflicts that exist between the needs of science, on the one hand, and

those of the general press, on the other.

When *Nature*, one of the most prestigious scientific publications in the world, agreed to publish Benveniste's study, it was well aware that this work would be regarded as extremely controversial. Indeed, when Benveniste and his colleagues first submitted their work, about two years earlier, the journal turned it down, insisting that findings with such revolutionary implications needed to be reproduced in several other, independent laboratories. Benveniste therefore con-



**The Benveniste experiment.** Antibodies in dilute solution were detected by their ability to release histamine from human basophil cells (top panel). The cells contain specific receptors for the antibodies (1), and when the antibodies bind to these receptors (2), histamine is released into the medium. The amount of histamine released can be related to the concentration of antibody present in the solution. The researchers thus prepared a series of test tubes of increasingly dilute antibody solutions (bottom panel, left); at the highest dilutions used, there should theoretically have been no antibody molecules present. When the antibody effect (histamine release from the cells) was determined, however, a significant effect was observed at even the very highest dilutions (bottom panel, left). Another curious and unexplained observation was that the antibody effect occurred in a cyclical fashion; at high dilutions, the effect would disappear, then reappear at still higher dilutions.



tacted several other research groups working in a similar area, and was eventually able to produce these independent studies.

Even then, however, *Nature's* editor, John Maddox, was unsatisfied. In a move that seemed almost unprecedented in modern scientific publishing, he stipulated that his journal would publish Benveniste's study only if he were subsequently allowed to bring to the French laboratory a small group of investigators chosen by himself. These investigators would watch Benveniste's group carry out its studies, then attempt to reproduce them. Benveniste, faced with the choice of either accepting such unusual conditions, or not being published at all, agreed.

What followed has been described by almost everyone except Maddox and his hand-picked committee as more of a circus than a serious scientific investigation. In the first place, the committee included no one with an adequate background in immunology, Benveniste's field of expertise; on the contrary, its composition by itself suggested a bias on the part of *Nature*, an *a priori* assumption that Benveniste's work was a fraud. Besides Maddox, the committee consisted of just two men: James Randi, a professional magician best known for his expose of a faith healer; and Ned Stewart, a scientist who now spends most of his time examining scientific publications for evidence of false or misleading data.

The way the men attempted to replicate Benveniste's work further aggravated the situation. It's customary to carry out such studies as Benveniste's "blind", that is, in a way such that the experimenter does not know which tubes contain which concentrations of antibodies. This is done so that the researcher can't intentionally or unconsciously exert a bias, and is commonly achieved by coding the samples, and giving the code to someone not directly involved in the study. Maddox's group not only coded the samples, however, but sealed the code in an envelope, and taped it to the laboratory ceiling. This unusual procedure seemed to imply further that they felt they couldn't trust Benveniste and his colleagues.

The Maddox committee's findings, which were reported in a subsequent issue of *Nature*, were highly critical of the Benveniste study. Among the points they raised were that the techniques of some of the French researchers were rather sloppy;

that experiments that did not reproduce their highly unexpected findings were ignored; and that no attempt was made to control for possible observer bias. In a response printed in the same issue of the journal, a very angry Benveniste blasted Maddox and his group for their lack of immunological expertise, their assumption of bias, and for putting him in a position where he had to accept such an invasion of his laboratory, and a calling into question of his honesty.

**It has become almost commonplace for scientists to learn about important breakthroughs in their field through the newspapers, before the work appears in a scientific journal.**

While most scientists believe that Benveniste's studies are not reproducible, he has evoked considerable sympathy, because of the way his case was handled by *Nature*. Conventionally, research findings are judged according to whether independent laboratories can reproduce them. Eventually, it is argued, a large number of similar studies by other investigators will settle the issue one way or another.

The unprecedented procedures that *Nature* followed in this case thus seem to represent a usurpation of authority. The business of a scientific journal is simply to publish research findings, or to reject them, the decisions normally being made with the help of advice from other researchers in the appropriate field. It has never been considered the journal's responsibility to attempt to validate results; indeed, no journal could possibly maintain the staff and the resources to do this on a regular basis. Thus *Nature*, in the view of most scientists, had only two legitimate options. Either it could refuse to publish Benveniste's findings at all, or it could publish them, and let other scientific laboratories attempt to reproduce them, as they surely would try.

Why wasn't that done in this case? The answer, I believe, goes to the heart of a major conflict in news reporting that has been growing in recent years, and still isn't generally recognized. In the past decade, coverage of science has greatly increased in most of the major media; many newspapers now devote entire sections to recent discoveries and theories, and all media

report major findings as they are announced. Scientists themselves have done a great deal to encourage this trend, as it increases their publicity, and thus improves chances of government support for their research. Thus many laboratories now announce major findings through press conferences, and it has become almost commonplace for scientists to learn about important breakthroughs in their field through the newspapers, before the work appears in a scientific journal.

While anything that helps improve public understanding of science is surely to be encouraged, a major conflict has arisen, because of different standards of journalism involved. One standard, that of the general media, holds that virtually any news can and should be reported. The other, the scientific standard, holds that only those reports that seem scientifically validated can be published.

It's not so much that scientists are more concerned with truth than the general media, as that different levels of truth are involved. To the media, what is of primary interest is not so much the scientific findings themselves as their impact—how they may change our lives. This is quite understandable, as most of the public lacks a detailed understanding of or interest in the scientific process *per se*; it's what scientists discover, not how they discover it, that captivates the public. Thus in the Benveniste case, what is of interest to the media is not whether his results could be reproduced by other laboratories, but simply that such a study was conducted, and such results were found. This much is indisputable fact, and from a traditional newsperson's view, is legitimate news. To report it is not necessarily to make any statements about the ultimate validity of the work—though much of the public will interpret it in this way.

*Nature*, a rigorously-reviewed journal that also happens to be very widely read and cited, found itself caught between the crossfire of these two journalistic standards. Had it acted according to a purely scientific standard, it probably would not have published Benveniste's study at all. Other journals had rejected this work, because of its inconsistencies with similar studies, and because of its impossible-to-believe implications.

However, editor Maddox knew that Benveniste's study was about to be



reported in the popular press. If the research were not reported in a scientific journal, the popular claims and conclusions certain to follow would go essentially unchallenged by the scientific community. At the same time, if it were only reported in *Nature*, in the same manner that other articles are and have been, its publication would seem to provide support for the popular claims.

As it turned out, Maddox's decision accomplished little, if anything, of what he intended it to. While the publication in *Nature*, which is closely followed by science reporters in the general media, ensured still greater publicity for Benveniste's research, the ensuing criticisms of the work, in the form of not only Maddox's committee's report, but many letters to the journal published in subsequent issues, were largely ignored by the media. Thus what is, for the vast majority of scientists, a non-issue has become a hot topic for many in the public.

Moreover, the investigation carried out by Maddox and his committee made *Nature*, one of the most prestigious journals in the world, look extremely unprofessional, if not outright laughable. To many scientists, the fact that Benveniste's work was published at all was evidence of pandering to popular tastes, attempting to scoop the general media on a sensational story. And by publishing the research, then immediately following with a supposed complete debunking of it, Maddox appeared to have set up Benveniste, gone out of his way to humiliate the French scientist. If Maddox really put so much faith in his committee's work, why, one wonders, could he have not carried out the investigation before deciding to publish, then made the latter decision in view of his committee's findings?

As the major media continue to emphasize science news, this kind of conflict is certain to grow, and perhaps to produce more cases like the Benveniste one. There is no simple solution to this problem, because it's essential that even the most outlandish ideas and findings, if they have any significant scientific support, be given a fair hearing. While very few other journals would touch a study like Benveniste's, I think it's important that journals like *Nature* exist which can bring such work to the attention of the scientific community. To do so serves as a constant

reminder to scientists that no matter how comfortable and certain they have grown with their worldview, none of what we call our established knowledge should be allowed to remain absolutely beyond challenge. If the general media are sometimes too willing to provide credibility to dubious discoveries or theories, the scientific journals generally have the opposite problem, being too set in their views.

With little fanfare or comment, *Nature* had in fact gone a long way from a traditional scientific journal's format some years before the Benveniste paper was published. The journal regularly covers a very broad range of science-related news, including many stories that have very little to do directly with anything occurring in a laboratory. There are editorials on these issues as well as on ones that are of direct scientific interest. A special section of the journal is devoted to commentary on articles published in the journal and in other journals, and thus encourages the kind of validation process that, in Benveniste's case, Maddox took upon himself. There is a great deal of advertising, and the Table of Contents, abandoning the simple listing of titles of conventional journals, calls attention to particular articles with pictures, capsule summaries, and other techniques so familiar to the general media.

### **How "far out" does a scientific finding have to be to require independent corroboration before publication, and who decides?**

Thus *Nature* seems certain to encounter more cases like Benveniste's in the future. The real problem concerns how to handle them. Not to publish a study like Benveniste's, in which the original reviewers of the paper could not find any obvious scientific flaws, invites charges of bias, of unfair treatment. To publish it like any other paper, on the other hand, implies a credibility that perhaps is premature.

The fairest and most convincing way to settle the issue would have been to ask several independent investigators, well qualified in immunology, to attempt to reproduce the findings exactly. While Maddox did ask Benveniste for such supporting studies, which were provided, the investigators were chosen by the Frenchman himself, and it seems, highly sympathetic to his views. In another relevant twist to the story, it turns out that several of

the investigators were in fact funded by a company that promotes homeopathic remedies—thus opening themselves to a charge of bias.

The use of truly independent investigators could have avoided such problems, and likely, would have resulted in no publication. On the other hand, even this solution raises problems, for it is not standard procedure in deciding whether a research paper should be published. Virtually all papers that are submitted to scientific journals are judged solely on their own merits; the researchers may be asked to provide additional data, but other researchers are not asked to replicate the work as a condition of publication. Thus the question arises, under what conditions will it be considered justifiable to ask for such independent corroboration? How "far out" does a scientific finding have to be to require such independent evidence, and who decides? There is no easy answer to this question, and in the hands of certain editors, such a policy could easily be used to prevent or delay publication of reasonable theories or discoveries that are simply personally displeasing to, or competitive with, their own.

In the long run, the conflict between science news and general news can be resolved only when the general public is much better educated about science. Most scientists actually have very little difficulty making up their minds about Benveniste's study. Even those with an open mind towards it recognize how unlikely the results seem, and are certainly not ready to embrace homeopathy simply on its basis. In fact, anyone with a high school level of chemistry should be able to understand the basis issue involved. A little more skepticism on the part of the public would greatly reduce the sensationalism associated with such a story, which in turn would reduce the pressure to publish it prematurely.

### **BOOK REVIEW**

**Excursions to the Far Side of the Mind**, by Howard Rheingold (NY: Morrow)

Science, noted Mark Twain, produces a rich harvest of speculation on the most trivial basis of fact. This being so, the explosive accumulation of scientific data



today, in fields such as astronomy, quantum physics, neuroscience, molecular biology, and human behavior, should provide a field day for those who want to imagine what life could be like in the future. Aside from science fiction authors, however, who have a license to engage in fantasy, and who tend to emphasize the extraterrestrial, few writers have mined this vein. Futurists, a relatively new breed of theorists, try to visualize society as it might be in ten or 20 years, but always with an eye towards what is most consistent with current trends. Futurism is intimately associated with social planning, and thus its practitioners are paid to limit their forecasts to what is likely, not what is conceivable.

Howard Rheingold works in this gap between what is completely believable, but rather obvious and dull, on the one hand, and pure fantasy, on the other. His visions of the future often seem unlikely, but never impossible. And while much of his writing appears to be tongue-in-cheek—the literary equivalent of another man's vision of the Far Side, cartoonist Gary Larson—there is an underlying seriousness in all of it.

In one of his most provocative pieces in this book, for example, he imagines a 21st century society in which all the men have been eliminated. Society's ability to freeze and store sperm means that the fundamental biological purpose of the male sex—providing one half of the complement of genes for the offspring—no longer requires the male organism. Fertilization can be achieved by artificial insemination.

This idea, while obviously easily within current scientific capability, is socially somewhat preposterous. Yet Rheingold lends it an air of credibility by showing how consistent it is with a number of current themes. One is the woman's movement, and the underlying insecurity it's producing in many men, who begin to worry that their traditional sexual roles are out-moded. Another is the spread of AIDS and other sexually transmitted diseases, which have made sex an increasingly dangerous endeavor. Still another, and most important, is sociobiology, the science that argues that all animal behavior is driven by natural selection of genes. In the extreme view of some sociobiologists, all organisms, including ourselves, are simply vehicles that genes create in order better to propagate themselves. Since the male vehicle is no longer necessary for this propagation to continue,

the most efficient society, a sociobiologist might argue, should eliminate it.

Rheingold, who lives on the West Coast, is familiar with the psychedelic culture of the '60's, and in a refreshing contrast to the majority of our current best science writers, recognizes that consciousness, not technology nor even knowledge, is the real unexplored frontier of the future. He describes a real-life, highly respected scientist who, in his spare time, synthesizes psychedelic drugs—the post-LSD generation, one might say—and tests them out: on himself. While the view that enlightened states can be brought about permanently through pills or other technology is a flawed, worn out theme (see *SCIENTIA*, Vol. 2, No. 6), Rheingold's discussion provides some needed balance to the current "drugs are all bad" paranoia sweeping society. And his vision of a future society of high consciousness individuals, however improbable, makes the essential point, which can never be repeated too often, that it's change in individual human beings, not in social structures, that is of primary importance.

Rheingold has the gift, found in the best science writers like Stephen Jay Gould, of beginning with a small point and gradually drawing from it lessons of literally cosmic significance. This is most evident in the chapter on trees. Rheingold begins by noting that Buddha was said to have realized enlightenment under the bodhi tree, and that this is hardly incidental; in most ancient cultures, the tree was a major symbol of growth and life. He goes on to observe that from our modern, scientific view, this symbolism is still quite appropriate. The basic, infinitely branching plan underlying trees and other plants is found in diverse other forms of nature, on all scales of size, from the blood vessels in our lungs to river deltas. From there, he introduces the reader to the notion of recursive structures, which may be a fundamental organizing principle throughout nature, and which are also the basis of traditional computer programs. Even the very concept of time and possibility, he points out, can be understood recursively.

Still other chapters in this book deal with new notions of space and time, of our relationships with machines, of anger, pain and shock, and the importance of our most neglected sense: smell. Throughout, Rheingold writes with easy informality and self-deprecating wit; he seems to under-

stand that the topics he discusses are so serious that he himself need not be. Despite our increasing preoccupation today with what the future will probably be like, perhaps our most important education comes from considering what it could be like. Rheingold's ideas may grow on the reader for a long time to come.

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